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DISEASES OF CONIFEROUS TREES

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JANUS R. WEIR,

1912.

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UNIV. OF CALIFORNIA

b. DISEASES OF CONIFEROUS TREES.

The natural forests of the greater part of the western United States consist almost entirely of coniferous trees. The annual lose from wood-rotting fungi in the national forests amounts to 9. very large item. An average of 2 to 10 per cent of the mature trees in all the forests are attacked and rendered worthless. some localities certain species, for example Pinus monticola, Tsuga heterophylla, Abies grandis, A. lasiocarpa, and Pseudotsuga taxifolia suffer to the extent of 50 to 75 per cent of the total stand in lumber feet.

The most destructive disease of the heartwood of conifers is caused by Trametes pini (Brot.) Fr. This fungus is not equally prevalent in all localities on the same species. It probably attacks nearly all species of conifers in the United States, except the junipers. The progress of the rot through the tree trunks is not very rapid, but the final effect is certain, as in the end it usually destroys the whole heart of the trunks and of portions of In some instances trees are killed outright, but in the limbs. the majority of cases they are so weakened by the fungus that they are broken off by the wind. This fungus rots the heartwood of the roots of trees also, and sometimes is communicated from tree to tree underground, where large roots of separate trees are in direct contact, thus passing from a diseased root to a healthy one.

The following species of trees are attacked by Trametes pie Abies balsamea, A. concolor, A. lasiocarpa, or its subspecies: A. nobilis, Larix laricina, L. occidentalis, Picea engelmanni, P. mariana, P. rubens, P. sitchensis, Pinus contorta, P. echinata

b. DISTARTS OF CONTEXPOUS TERRS.

The natural located party of configures trees. The sample loss from road-rottra; fungi in the national forests amounts to a loss from road-rottra; fungi in the national forests amounts to a very large item. An average of 2 to 10 per cent of the mature trees in all. the forests are astacked and rendered-worthless. In some localities certain species, for example Finus monticols, lough heterophylla, Abies grandis, A. lasicourps, and Fagudotsuge taxisfolis awire to the extent of 50 to 75 per cent-of the total standing lumber: feet.

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The following species of trees are attacked by Trametes or its subspecies: Abits balsames, A. concolor, A. hariourps .

A. notilie, isrix laricina, L. occidentalis, Fisca engalsagual,

P. mariahu, P. rabena, P. of chensis, Pigus comorts, P. echinata

P. edulis, P. flexilis, P. lambertiana, P. monticola, P. palustria, P. penderesa, P. resinosa, P. rigida, P. strobus, P. strobiformia, P. taeda, P. virginiana, Pseudotsugataxifolia, Thuja plicata, Tsuga Canadensis, T. heterophylla, and T. mertensiana.

Polyporus schweinitzii Fr. ranks next in importance to Trametes pini in the natural forests. It commonly attacks the heartwood of the base or butts of the trunk and of the roots of coniferous trees, especially the Douglas firs. The rot rarely extends farther up the trunk than the first saw log. The fungus spreads from diseased trees to healthy ones underground, where larger roots come in contact with each other. Where this takes place it is common to find groups of trees affected with the fungus, and sometimes an entire group of Douglas firs are killed outright. In most instances, however, the trees weakened by the fungus are either uprooted or broken off by the winds before death.

The heart rot caused by Polyporus schweinitzii is of a red brown color, breaking into coarse cubes; and has been found in the following species of trees: Abies amabolis, A. arizonica, A. balsamez. A. concolor, A. Grandis, A. lasiocarpa, A. shartensis, Larix laricana. L. lyalli, L. occidentalis, Picca engelmanni, Picea sitchensis, Picca albicaulis, P. aristata, P. arizonica, P. contorta, P. divaricata, P. echinata, P. flexilis, P. lambertiana, P. monticola, P. murrayana. P. palustris, P. ponderosa, P. resinosa, P. strobus, P. strobiformical P. taeda, P. virginiana, Pseudotsuga taxifolia, Tsuga mertensiana, and T. heterophylla.

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odulis, P. Tiexillo, P. Laubertians, F. moniscia, P. palustris, P. pridoresa, P. pridoresa, P. resinosa, P. rigida, F. atrobiga P. atrobifornis, P. virginiana, Paerkatavirgila, Pung plicata, Touga Commencate, T. heterophylla, and P. mertensians.

Polyporgs solweinissis Fr. sapis serial in imperious to part to the base of butts of the trust and of the base or butts of the trust and of the roots of saniferous trees, especially the Deuglas fire. The set saroly estends tarther to the trust then the fires saw leg. The furgue spread from discauda trees to healthy ones underground, where larger roots come in est tast with each other. Where this takes place it is carried to find groups of trees affected with the fungue, and sometimes an entire group of Douglas fire use killed outsignt. In most instance, however, the trees weakened by the fungue, say estimes unrooted or broken

The heart rot esues by Polyposus assive integer is a second trong select breaking this course subset, and the consumer species of transmibles candelies. A. existence, A. balkanus A. concolor, A. Grandis, A. losiseers, A. shartenete, larky larlust L. concolor, A. Crandis, A. losiseers, A. shartenete, larky larlust lastif. L. occidentalis, Pieca engalapsani, Pices sitchenete, Pintalbicaulis, P. aristata, P. aristata, P. aristata, P. aristata, P. andricete, P. monticola, P. murrayare achinete, P. flexilis, P. lambertisma, P. monticola, P. murrayare polymetris, P. ponderosa, P. resinosa, P. strobus, P. atrobiformi P. taeda, P. virginiana, Pescudoteum taxifolia, Soura merteneiana.

A heart rot apparently identical with that caused by Schweinitzii is found in the following species of trees, upon which the sporphores of the fungus have never been found: Juniperus monosperma, J. pachyphloca, J. scopulorum, J. utahensis, Taxus brevifolia, and Thuja plicata.

Formes laricis (Jacq.) Murr. is the cause of a yellow to redbrown heart rot of living and dead trees of a number of species

of conifers in the West. In the Morthwest it causes a common heart

rot of larches; and in the Southwest, of some species of pines.

It is known to attack the following species of trees: Abies concolor,

Larix occidentalis, Picca engelmanni, P. sitchensia, Pinus lambertiana,

P. murrayana, P. ponderosa, Pseudotsuga taxifolia, and Tsuga hetero
phylla.

In northern Arizona, Pinus ponderosa is diseased more often with this than any other fungus.

Echinodontium tinctorium E. & E. is the cause of a very interesting heart rot of living trees of a number of species of conifers. In the earlier stages of the rot, the wood is slightly discolored, and becomes very wet. The fungus discolors a portion of the wood, attacking first the spring wood of each annual ring, causing the wood to separate into flakes. Finally the wood is for the greater art dissolved and left in brown strings, leaving the tree hollow.

The following species of trees are attacked by Echinodontium tinctorium: Abies amabalis, A. arizonica, A. concolor, A. grandis, A. lasiocarpa, A. magnifica, A. nobilis, Picea engelmanni, Pseudotsuga taxifolia, and Tsuga heterophylla. This fungus is very

A heart rot apparently, identical, with that cruded by elementicial is found in the following species of trees, upon which he escaphores of the fungus have never been found: Juniperus conceptual, J. pachyphloca, J. ecopulorum, J. utahensis, Taxus rowifolds, and Thuja plicata.

Paraga laricie (Jaga) Murr. is the cause of a vellow to reduced heart rot of biving and dead trees of a number of species of confers, in the West. In the Morthwest it causes a common heart of a larches; and in the Southwest, of some species of pines.

The in house to attack the tollowing species of trees: Abies concolor, and x confersies, Pines larbertiens, and x confersies, Pines larbertiens, and x maximum, P. sitchensia, Pinus larbertiens, and Isuma hoteror

Is northern Arisons, Pinus ponderess is discussed more often

Toning heart 19t of living trees or a number of species of coninteresting heart 19t of living trees or a number of species of coniters. In the capture, glages of the rot, the wood is slich if the
colored, and begomes using wet. The fungus discours a portion of the
insert, and begomes using wet. The fungus discours of the
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the week to separate into flates. Finally the wood is for the greater
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The following species of frees at according A. granding A. concolor, A. granding A. lepice the enceloping Pasudot-A. lepice enceloping Pasudot-A. lepice enceloping Pasudot-A. lepice the feature of the servence of the serve

destructive off the wood of hemlock trees in the Northwest, and of species of Abies wherever found in the West. It is not infrequent to find 50 to 90 per cent of mature trees diseased by it, and rendered useless for lumber or timbers.

A rot unaccompanied by sporophores similar to the one produced by Echinodontium tinctorium occurs occasionally in Pinus ponderosa, Pinus contorta, and Thuja plicata. In general, however, the fungus occurs on species of Tsuga and Abies, almost to the exclusion of other heart-rotting fungi, as in the case of Trametes pini, infection apparently taking place later in the life of the tree, and the former fungus inhabits the heart of the tree, to the exclusion of the other.

Polyporus sulphureus (Bull.) Fr., or a form of this species of fungus causes a red-brown rot of conifers, attacking both heart and sap wood. The rot caused by this fungus, resembling very much in color and appearance that caused by Fomes laricis, and to some extent that caused by Fomes pinicola (Sw.) Cooke. It is rarely found fruiting on living conifers. The wood of the following species is attacked by Polyporus sulphureus: Abies grandis, A. magrifica, Larix occidentalis, Picca engelmanni, Pinus contorta, P. monticola, P. ponderosa, P. jeffreyi, Pseudotsuga taxifolia, and Tsuga heterophylla.

Polyporus amarus Hedgo. is the cause of the pin rot or peak?

ness of the incense cedar (Librocedrus decurrens) in Oregon and

California. From 50 to 90 per cent of the older trees in this

region are affected to some extent by this fungus, causing a great

loss in the wood products of this valuable species of tree.

destructive of the wood of tender trees in the Morthwest, and

at expected of Ables wherever frauds in the West. It is not infro
of the College of the 90 per cent of mature trees discussed by it.

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A rot unaccompanied by aperophores similar to the one pro-

duced by Schinodonilum tinctorium occurs occasionally in Finus
penderona, Pinus conterts, and Thurs pilosts. In general, heserar,
the fungus occurs on epicies of Tauga and Thies, almont of the exclusion of other logaritheorthan funct, as in one case of franctes pini,
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Polyporne sulphureus (Sull.) Er., or a form or this openion of tungus causes a red-brown rot of conifers, attacking both heart and sap wood. The rot quies by this fungus, resembling very much in color and appearance that caused by Fomes lariots, and to some extent that caused by Fomes pinicels (Sa.) Cooke. It is rarely found truiting on living conifers. The wood of the following species is attacked by Polyporus culphursus: Abies grandis, A. magnifical, Larix conidentalis, Picca shgelmoni, Pinus contorts, F. modificula, P. ponderosa, P. jeffreyi, Pschuotauga taxifolia, and federoshylla.

Polyporus arming Medso, is the cause of the pin not or peak
ness of the inverse cedar (Cibrocedius incurrens) in Oregon and
california. From 50 to 50 per cent of the older trees in this
region are affected to some extent by this fungue, causing a gickly
loss in the west products of this valuable species of tree.

A species of Lentinus either identical or closely related to Lentinus lenideus Fr. attacks the heartwood of both living and dead conifers. It forms very large fruiting bodies on Pinus ponderosa in Arizona, and causes a yellow to red-brown rot much like that produced by Fomes laricia, but less extensive. It also attacks the wood of Pinus conterta, Abies concolor, Larix occidentalis, and Pseudotsuga taxifolia.

A species of Hydrum related to Hydrum coralloides Scop. attacks the wood of both living and dead trees of Abies concolor (Gord.) Parry, A. grandia Lindl., Picea engelmanni Engelm., and Pseudotsuga taxifolia. The fungus fruits in late autumn, and produces a peculiar honey-combed rot, in which there is an absence of cellulose layers around the small cavities as in the rot caused by Trametes pini.

In general the heart-rotting fungi in conifers enter the trees through exposed heartwood in broken branthes, fire scars, etc., and do not attack the sapwood first. This is especially true of Trametes pini, Fomes laricis, and Echinodontium tinctorium. In most localities in the Northwest Trametes pini often continues to fruit abundantly on dead logs and stumps long after the death of the trees, but in the Southwest the dry climate usually prevents the formation of sporophores except on living trees, and then only sparsely. This is considered the chief reason for the greater prevalence of this fungus in the Northwest.

Polyporus schweinitzii fruits on the roots and dead stumps of conifers, especially of the Douglas fir, all over the forests of the Western United States, but more abundantly in the Northwest

A species of lentinus either identical or closely related to cotinus lepideus Er. attacks the heartwood of both living and lead confiers. It forms very large fruiting codies on Pinus pote lerosa in Arizona, and causes a yellow to red-crown rot much like that produced by Fores laricia, but less extensive. It was attacks the wood of Pinus conturts, Abies concolor, Larix occuder:

A species of Hydrum related to Hydrum aspailoides Seconstited the wood of both living and dend trues of Abies concolor (Cord.) Parry, A. grandia Linci., Pises engelmenti Engelm., and secudetauga taxifolia. The fungua fruits in late autumn, and produces a peculiar honey-combed ret, in which there is an absence of cellulose layers around the amili cavities as in the rot saused by Trametes pini.

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